

University of Groningen

**The importance of cultural aspects in impact assessment and project: development reflections from a case study of a hydroelectric dam in Brazil**

Hanna de Almeida Oliveira, Philippe; Vanclay, Frank; Langdon, Esther Jean; Arts, Jos

*Published in:*  
Impact Assessment and Project Appraisal

*DOI:*  
[10.1080/14615517.2016.1184501](https://doi.org/10.1080/14615517.2016.1184501)

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2016

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Hanna de Almeida Oliveira, P., Vanclay, F., Langdon, E. J., & Arts, J. (2016). The importance of cultural aspects in impact assessment and project: development reflections from a case study of a hydroelectric dam in Brazil. *Impact Assessment and Project Appraisal*, 34(4), 306-318.  
<https://doi.org/10.1080/14615517.2016.1184501>

**Copyright**

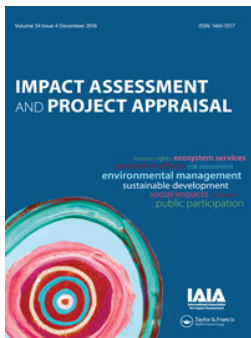
Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

**Take-down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.



## The importance of cultural aspects in impact assessment and project development: reflections from a case study of a hydroelectric dam in Brazil

Philippe Hanna, Frank Vanclay, Esther Jean Langdon & Jos Arts

To cite this article: Philippe Hanna, Frank Vanclay, Esther Jean Langdon & Jos Arts (2016) The importance of cultural aspects in impact assessment and project development: reflections from a case study of a hydroelectric dam in Brazil, *Impact Assessment and Project Appraisal*, 34:4, 306-318, DOI: [10.1080/14615517.2016.1184501](https://doi.org/10.1080/14615517.2016.1184501)

To link to this article: <http://dx.doi.org/10.1080/14615517.2016.1184501>



© 2016 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 01 Jun 2016.



[Submit your article to this journal](#)



Article views: 399



[View related articles](#)



[View Crossmark data](#)



Citing articles: 3 [View citing articles](#)

# The importance of cultural aspects in impact assessment and project development: reflections from a case study of a hydroelectric dam in Brazil

Philippe Hanna , Frank Vanclay , Esther Jean Langdon and Jos Arts

Faculty of Spatial Sciences, Department of Cultural Geography, University of Groningen, Groningen, The Netherlands

## ABSTRACT

Failure to consider the cultural and social factors of projects can lead to situations where mitigation does not effectively address the impacts they were intended to alleviate, and can even create other impacts. We critically analyse the processes of designing and implementing a social and environmental compensation program for the Lajeado Hydroelectric Dam in the Amazon region of central-northern Brazil. This mitigation program caused a wide range of social and environmental impacts on the Xerente Indigenous people, such as intra-group conflict, and changes in agricultural practices and food regime. Based on qualitative fieldwork and an extensive document analysis, we present a contextualization of the region, the project, the Xerente people, and their cosmological understandings. We consider the perspectives of a broad range of stakeholders about the compensation program and its outcomes, and demonstrate how traditional cultural practices and values played a role in the unfolding of the program. Better comprehension of sociocultural aspects through the use of ethnography, ongoing consultation, and meaningful community participation in the planning and implementation of mitigation measures are recommended.

## ARTICLE HISTORY

Received 3 December 2015  
Accepted 15 February 2016

## KEYWORDS

Free, prior and informed consent; environmental licensing process; social impact assessment; EIA follow-up; cosmology; anthropology

## 1. Introduction

We argue that to fully comprehend the environmental and social impacts of projects in cross-cultural contexts, it is essential to include ethnographic fieldwork as a component of the social impact assessment (SIA), environmental impact assessment (EIA) and other studies. Despite the warning of Ballard and Banks (2003, p. 289) that 'mining is no ethnographic playground' (due to complexity of the stakeholder interactions and strategies), we demonstrate that ethnographic data can foster better cultural understanding among impact assessment and social performance practitioners, especially those responsible for developing and implementing the mitigation measures and compensation arrangements (Roper 1983; Chase 1990; Stoffle et al. 1991; Thanner & Segal 2008). Without proper consideration of the local cultural context, even well-intentioned mitigation measures can ultimately create unintended impacts (Vanclay 2002; 2012). In current practice around the world, most SIAs that consider impacts on Indigenous people are usually 'ethnographically thin,' thus limiting their capacity to properly promote culturally adequate and effective mitigation measures (Westman 2013).

In order to advance the proposition that ethnographic fieldwork is essential, we examine a specific case that of the compensation plan developed to mitigate the

impacts of the Lajeado Hydroelectric Dam in the Brazilian Amazon region. The Lajeado Hydroelectric Dam, which is officially called the Luis Eduardo Magalhães Dam (Lajeado for convenience), was constructed in the state of Tocantins in central-north Brazil between 1996 and 2001. With a reservoir area of 630 square kilometers, the powerplant has an installed capacity of around 900 MW (Engetec 2015). Following an EIA completed in 1996, a compensation program called Programa de Compensação Ambiental Xerente (PROCAMBIX) was designed in 2000 to mitigate the social and environmental impacts of the dam on the 3000 Xerente Indigenous people, who are located a few kilometers downstream. The history of contact between the Xerente (who are also known as *Akwẽ*) and the 'neobrazilians' (as Curt Nimuendajú refers to non-Indigenous Brazilians) is marked by violence and land struggle with missionaries, gold seekers, and settlers (Nimuendajú 1942; de Paula 2000).

Considered to be the first private dam in Brazil, Lajeado was part of a broader government strategy that focused on bringing development to the then recently created Tocantins state and its capital city, Palmas. Due to its strategic location in the center of Brazil, the discourse about 'development and modernization' was very dominant in its formation (Zitzke 2007) and remains strongly present

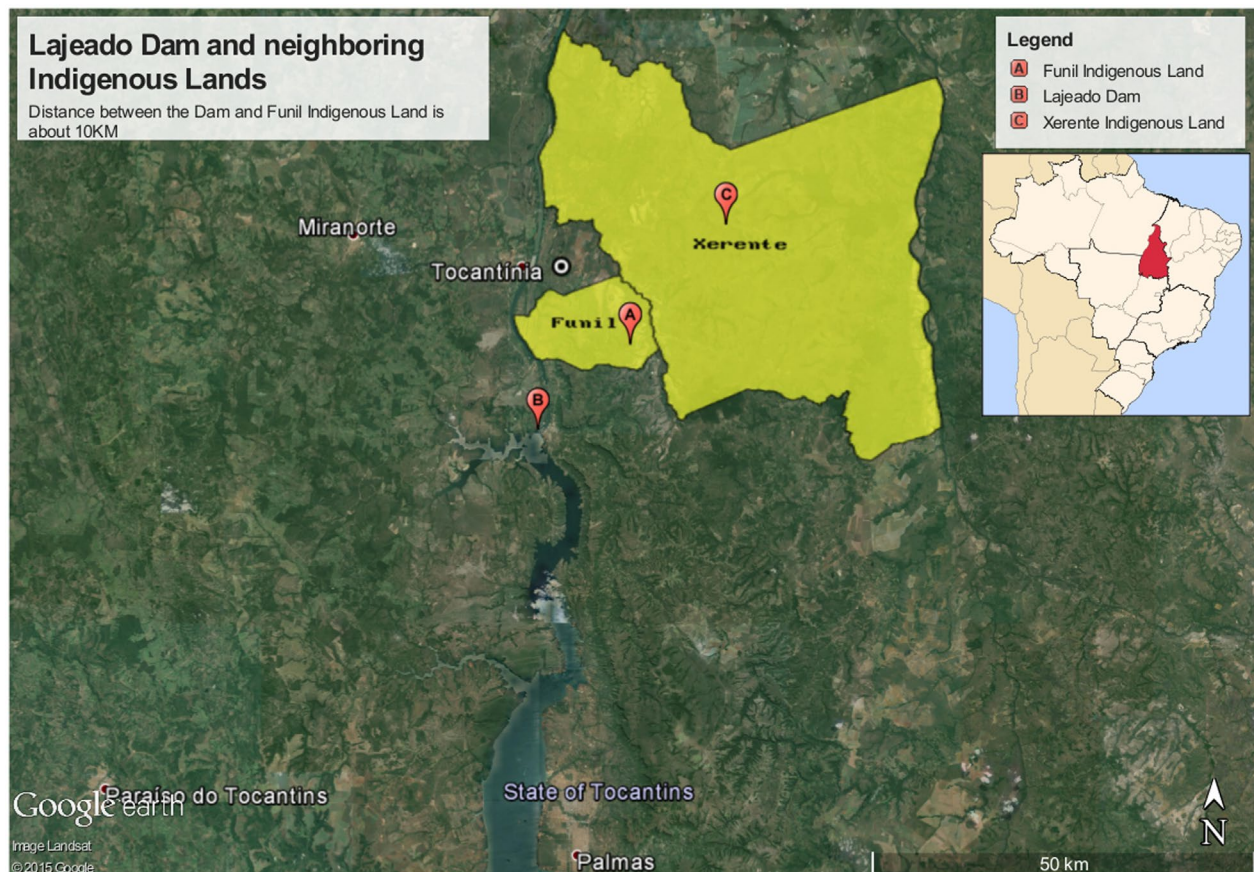
today (Parente 2015). This development trajectory has fueled conflicts between Indigenous and non-Indigenous communities, with the Indigenous peoples being perceived as obstacles to the economic development of the state (Menestrino & Parente 2011).

To analyse the performance of the PROCAMBIX compensation program, we give particular attention to Indigenous perceptions of the impacts of the dam and the mitigation measures. This is supported by a description of the broader socio-political context in which the compensation project was designed and implemented – aspects that are not usually considered in impact assessment (O’Faircheallaigh 2011; Baines et al. 2013). This paper considers both the social and environmental impacts because, especially in an Indigenous context, they are highly integrated (Slootweg et al. 2001; Vanclay 2002). Careful consideration is given to the cultural and socio-political aspects that can play a role in project development, such as native cosmological concepts and inter-ethnic relations (Westman 2013). These aspects are important to better comprehend the efficacy of the mitigation measures and to provide a fuller understanding of social impacts, especially when traditional communities are involved. Traditional communities are not necessarily Indigenous, but nevertheless are culturally different from the broader society, and have a special connection to their land and territories (Hanna et al. 2014).

Arguably, the primary objectives of EIA and SIA are to identify possible impacts and propose mitigation and enhancement measures (João et al. 2011; Esteves et al. 2012; Morgan 2012). To fully achieve these objectives and to improve the overall quality and effectiveness of future interventions, follow-up evaluation of EIAs, SIAs and mitigation, and compensation measures are necessary (Marshall et al. 2005). To fully understand the perspectives of impacted groups, we argue that ethnographical fieldwork is necessary, especially in culturally diverse situations. In order to demonstrate this, we discuss the follow-up evaluation of PROCAMBIX and consider the varying perceptions of the impacts, program design, and efficacy of the mitigation measures that were deployed. Recommendations for improving the outcomes of similar projects are provided.

## 2. Methodology

This paper utilizes fieldwork conducted by the primary author over a two-week period in May 2014 in the Brazilian municipalities of Palmas, Tocantínia, and Miracema do Tocantins. Figure 1 is a Google Earth image of the general location showing the large long lake created by the dam and two Indigenous territories, Funil and Xerente, both of which are inhabited by the Xerente people.



**Figure 1.** The Lajeado Dam and the neighboring Indigenous lands.



In order to understand the perspectives of those who were involved in PROCAMBIX, semi-structured interviews were conducted with key informants covering a wide range of stakeholder groups. The people interviewed included: representatives of community associations; Indigenous elders; staff from the state government environmental agency (Naturantins); one of the solicitors from the Federal Office of Public Prosecution (*Ministério Público Federal* [MPF]) responsible for mediating the agreement between the proponent and impacted communities; staff from the NGO *Conselho Indigenista Missionário* (CIMI), an important Catholic NGO defending Indigenous issues; academics from the Anthropology Department of the State University of Tocantins; and staff from the National Indigenous Agency (FUNAI).

A total of 15 interviews were conducted by the primary author, a native Brazilian. Key informants were identified using a snowball technique. Where permission was granted, which was in about half the cases, interviews were recorded and transcribed, while in other cases extensive handwritten notes were taken. In addition to the formal interviews, a range of other social research techniques typically applied in fieldwork settings were used, including participation observation, field notes and diarising. The qualitative data analysis software package, Atlas-Ti, was used to assist in the analysis. Topics discussed in each interview related to: the impacts of the dam; the negotiation process for the compensation program; implementation of the program; the interviewee's personal assessment of the positive and negative aspects of the program; and their views about mistakes made and what could have been done better. The company, INVESTCO, which was responsible for building the dam and implementing the program, was contacted several times, but was unavailable for an interview. The social research principles of respect for participants and informed consent (Vanclay et al. 2013) were observed throughout the whole research process, and all participants were aware of the nature of our research.

We are aware that the limitations of our methodology do not allow a comprehensive study of the Xerente people or a full analysis of the Lajeado Dam. Nevertheless, we feel that we have an adequate basis by which to make the statements we do. This is not a full ethnographic study, which would have required deep immersion and a longer time period than was available. While this was originally intended, the complexities of conducting ethnographic fieldwork about a program that was concluded over 10 years ago made this impossible. Also, during the time of the fieldwork, an investigation into alleged corruption with PROCAMBIX was underway making some informants reluctant to speak, at least about certain topics. Nevertheless, appropriate key informants from almost all relevant stakeholder groups agreed to be interviewed. To counter the limitations in the fieldwork, we have triangulated as much as possible, especially by

undertaking an extensive document analysis, including of all project-related documents and anthropological literature about the Xerente and Jê peoples.

### 3. The dam, the licensing process and the compensation plan

A timeline of events is given in Figure 2. Following several assessments of the hydroelectric potential of the Tocantins River since the 1960s, discussions on the construction of a dam were initiated in earnest in the early 1990s. An EIA commissioned by the electricity company, CELTINS, was completed in 1996 (THEMAG 1996). Following the requirements of the Brazilian environmental licensing procedure (see Hanna et al. 2014), an item called 'Indigenous Issues' was included in the socio-economic chapter of the EIA report. This focused almost exclusively on the history of the Xerente people and their relations with the non-Indigenous society, and no social impacts from the dam were detailed other than the generic impact of development pressure on Indigenous territory. In 1997, an open tender to construct the dam was advertised, with the winning and only bid being INVESTCO, an *ad hoc* consortium that comprised Grupo Rede, Companhia Energética de Brasília (CEB), and the multinational Energias de Portugal (EDP). INVESTCO was established as consortium specifically to build and manage the Lajeado dam (Araújo 2003).

The licensing process for the dam was controversial, and led to many protest actions from the different interest groups (Araújo 2003; Zitzke 2007). It was initially alleged by INVESTCO that, because the Indigenous communities were located downstream, there was no need to do impact studies relating to the Indigenous peoples. It was stated by several interviewees that it was generally accepted that downstream communities would not be affected by a dam, and that it was common practice for EIA studies not to consider downstream communities. Cernea (1997) has also stated that downstream impacts are usually understated and ill-considered by dam proponents and in impact assessments. The compensation plan, PROCAMBIX, only arose in 2001 as a result of pressure over several years from civil society in relation to the lack of interest by INVESTCO in addressing the social impacts on the Xerente people.

Because of concern about the dam, a group of civil society organizations got together and organized the so-called 'First Seminar on the Lajeado Dam,' which was held in October 1998. It was attended by NGOs, university staff, representatives of the movement of dam-affected people (MAB), trade unions, the proponent, and the state level licensing authority (Naturantins). The seminar was considered by some interviewees as being historically significant in that it led to acknowledgment of the existence of social impacts from the dam. CIMI had a major role in facilitating the participation of Indigenous leaders who spoke about the potential impacts on their

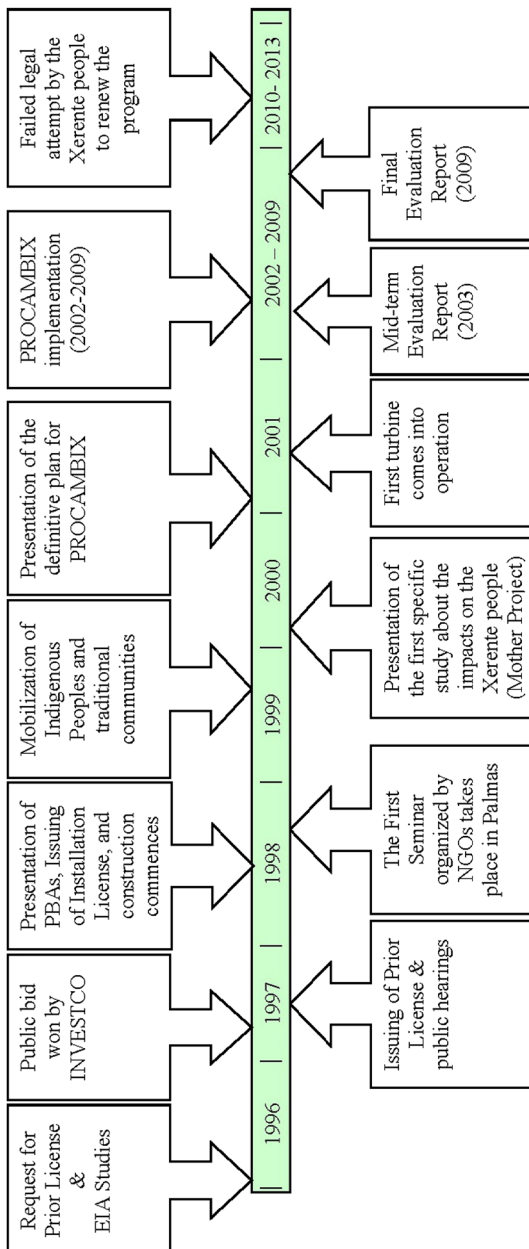


Figure 2. A timeline of events relating to the Lajeado Dam and Procambix (based on Araújo 2003 and Cordeiro 2009).

livelihoods. After the seminar, which had been very successful in influencing local public opinion about the likely impacts of the dam, the competent authorities (IBAMA, Naturantins, FUNAI) started to pressure INVESTCO to acknowledge the social and environmental impacts on the Xerente people and to design mitigation measures. According to our interviews and the literature available (Araújo 2003; Zitzke 2007), it was only due to the subsequent widespread social protest that the social issues were eventually considered.

In 1999, INVESTCO commissioned the Federal University of Mato Grosso and the NGO Operação Amazônia Nativa (OPAN) to identify a set of actions to mitigate the impacts of the dam on the Xerente people (OPAN-GERA 2000). Their multidisciplinary report proposed the establishment of a Xerente Environmental Management Program, which would focus on three broad themes: (1) Territory and Natural Resources; (2) Food Security and Income Generation (i.e. livelihood); and (3) Culture and Citizenship. They recommended Indigenous participation in the development, execution, and monitoring of the program as a fundamental principle. A related recommendation was to establish a Management Council comprising the licensing institutions, INVESTCO, and representatives chosen by the Xerente. This study became informally known as 'the Mother Project' and later became the basis for formalizing an agreement about a compensation program between the proponent, the licensing institutions, and the Xerente.

After completion of the report in May 2000, there was much negotiation about the terms of the agreement. Lack of interest by the proponent and licensing institutions in concluding this discussion led to much concern by the Xerente. After various protest actions – including the detaining of company and government staff for several hours by a group of Indigenous activists (Agência Estado 2001) – the concerns of the Xerente started to be taken more seriously. According to one of our key Indigenous informants, it was only after the detention that FUNAI became fully involved in the process. The conflict led to intervention by the Federal Office of Public Prosecution, which in 2002 negotiated a Terms of Adjustment of Conduct with the parties for establishing the Xerente Program for Environmental Compensation (PROCAMBIX). Although the mother project originally recommended a budget of R\$14 million for the compensation and mitigation activities, after a tough negotiation process, the program that was eventually agreed and implemented had a budget of only R\$10 million. In 2001, this would have been roughly equivalent to US\$5 million.

The PROCAMBIX projects that were ultimately implemented were largely based around the three sub-themes defined in the mother project and were implemented over eight years, from 2002 to 2009 (Cordeiro 2009). The Territory and Natural Resources component had a set of

actions focusing on ecological zoning and environmental education. Food Security and Income Generation implemented many strategies, including the stimulation of alternative livelihoods such as the raising of chickens and cattle, fish farming, fruit orchards, honey production, and the provision of tractors to mechanize agriculture. Culture and Citizenship focused on strengthening Xerente culture and social organization through the construction of a cultural center and promotion of traditional activities. An Administrative and Technical Support component was added for managing the program. In order to implement the program, a steering committee comprising six non-Indigenous and six Indigenous representatives was established. The non-Indigenous representatives were from INVESTCO, IBAMA, FUNAI, the Office of Public Prosecution, Naturantins, and the Secretary of Citizenship and Justice of Tocantins State. According to our interviews, CIMI was 'excluded' from the process due to its critical stance, such as being against the use of compensation funds to pay for education and health, considered by CIMI as a government obligation and not a mitigation action.

The implementation of PROCAMBIX was marked by several logistic difficulties in the acquisition of materials and the transfer of resources between the various institutions. Money was transferred twice a year from INVESTCO to the steering committee. However, for various reasons that are unclear, these payments were made via FUNAI, leading to delays in the funding being available to the projects. A new association, Associação Indígena Akwë (AIA), was created to manage the application of the funds, undercutting the power and resources of the existing association, Associação Indígena Xerente (AIX), which created resentment and hostility between the factions.

A mid-term evaluation report (de Paula 2003) was commissioned. Despite being a very good analysis of many of the issues that were beginning to emerge with PROCAMBIX, its recommendations were largely ignored by the Steering Committee and there was little memory of that report at the time of the fieldwork for this research. Perhaps the most important concerns were that there was inadequate financial monitoring and a high potential for improper conduct. A substantial final evaluation (Cordeiro 2009) commissioned by the German Agency for International Development (GIZ, then GTZ) was completed in 2009, largely raising the same issues as the midterm evaluation. In contrast to the midterm evaluation, however, there was considerable awareness of the final evaluation and it was frequently mentioned in our interviews. All people we interviewed who mentioned the report spoke very highly of it, and considered that it was a fair description of what had happened with the implementation of PROCAMBIX. These evaluations have informed our analysis, and are considered in detail further below in our paper.

Our interviewees told us that the materials needed for the program had to be purchased through the

government procurement system, which was considered to be bureaucratic and inefficient. Requisites had to be procured from the cheapest supplier, without consideration as to where in Brazil they were located or how long delivery would take. One interviewee related the case of an agricultural project where seeds were needed at a critical time for sowing in order to secure a good harvest. However, due to delays in the transfer of funds and the transaction process to purchase the seeds, the optimal planting time had already passed before they arrived. Another interviewee described the purchase of chickens from a supplier over 2000 km away in Southern Brazil. Since the chickens were not used to the warmer climate of Tocantins, many perished soon after arrival. Furthermore, as industrially bred chickens they had been de-beaked. Totally dependent upon commercial chicken feed, they could not scavenge for their own food. This resulted in extra costs and greater management effort in obtaining the feed and an increased workload in feeding them. These examples demonstrate how the compensation resources were wasted due to bureaucratic delays and inadequacies involved in the implementation of PROCAMBIX.

Many non-Indigenous people were contracted as consultants and paid out of the fund, providing a range of services such as technical support and general administration. An older Xerente described these non-Indigenous actors as being like 'jaguars preying on game' and noted that as soon as the feast was over [i.e. the funds for the compensation program were exhausted], the 'white jaguars' upped and left. Similarly, a Xerente (de Paula 2003, 2005) suggested that the program was perceived as a 'big fat tapir' to be feasted upon. In 2010 after the program had ceased, the Xerente attempted a class action suit to claim further compensation for the impacts of the on-going operation of the dam. There was a lengthy court case, with a judge deciding in 2013 that INVESTCO had fulfilled all its obligations and that the Xerente were not entitled to further compensation (Ação Civil Pública 2013).

#### 4. Creation myths and political factions

The Xerente people are part of the broader Jê ethnic group. As with all Indigenous groups, mythology plays a key role in understanding the current order of the world. The jaguar, for example, is present in the Jê myth about how humans acquired fire. In the beginning, only the jaguar possessed fire and would not share it. In order to cook and to have warmth, the Xerente needed to capture fire from the jaguar. They eventually tricked the jaguar and were able to gain possession of fire. For being greedy and not sharing, the jaguar was punished and forever after could only eat raw meat (Mindlin 2002). This myth positions the jaguar as an important symbol to describe greedy people, but it also justifies the right of the Xerente to take things denied them in critical situations.

In general, Jê peoples share some common characteristics, one of which is a complex kinship system based on clan moieties (Maybury-Lewis 1989). The Xerente creation myth is based on the duality between the mythic heroes embedded in the sun and the moon, and is represented in the division between the exogamous moieties. The sun moiety is called *Doí* and the moon *Wahirê*, which, depending on the academic source, are each composed of three or four clans (Oliveira Reis 2001).

These clans are very important political groupings, governing many aspects of life. For example, according to the prescriptions around marriage, members of one moiety should only marry members from the other moiety. Although these marriage rules are not fully practiced nowadays (Oliveira Reis 2001), in everyday life, especially in politics, moieties still play a strong role and create a stage for significant factionalism (de Paula 2000; Fernandes 2012). The factions result in varying political alliances, be they among themselves, or with non-Indigenous political actors from the region and occasionally with national and international allies. Leaders need to act as political strategists in order to access resources available through the various government programs. They must transit between multiple and different worlds – among the many local Indigenous communities, and the many non-Indigenous political spaces (de Paula 2000).

An interesting ritual is ‘the great fast,’ which was practiced by the Xerente to avoid having severe droughts. Nimuendajú (1942) wonders why this ritual would arise in the fertile and water-rich land the Xerente currently occupy. He speculates that the Xerente may have previously inhabited much drier lands closer to the São Francisco River region, where the ritual would likely have been meaningful. They took this ritual with them when they relocated hundreds of years ago and continued to practice it in their new environment where most agriculture was based on seasonal river flooding. This ritual reveals the cultural value of the seasonal flooding to the Xerente people and their livelihoods, and the direct relation between cosmology and their environment. The completion of the Lajeado Dam stopped the annual flooding and has led to the decline in fertility of downstream riverside land. Besides impacts on the Xerente cosmological order, the dam has also impeded the continuation of their traditional agricultural techniques based around the annual river flooding.

## 5. The sociocultural impacts of the dam and compensation program

As discussed earlier, the licensing and impact assessment processes for the dam were controversial and were marked by protests and distrust from the impacted communities. The concerns of the Xerente people were clearly expressed by Xerente Chief Isaac in his address to the First Seminar in 1998:

The Xerente people are very worried. Are the Xerente people ready to receive progress? Many people will move because they can't stand [the changes]. We have been talking with 30 chiefs in Serra da Mesa [where another dam has been built], and what we saw was dirty tricks. We do not want band-aid solutions (*remedinho*), we want things that help us guarantee that what is now on paper [referring to a range of promises by INVESTCO] is really going to be fulfilled. Today we are left in the bushes like animals. We need the authorities on our side, because not only the Indigenous but also many whites will suffer the impacts of this construction. (Seminário 1998, p. 37 – author translation)

Similar concerns were also expressed by Chief Domingos:

We know that there might be an increase in prostitution, alcoholism, the arrival of new diseases, and the invasion of Xerente lands due to our proximity to the construction site. (Seminário 1998, p. 38 – author translation)

Although, Brazil only became a signatory to ILO Convention 169 (on Indigenous peoples) in 2002 – establishing the state obligation to consult Indigenous peoples when their lives are affected by administrative or legislative actions and conferring on them the right to free, prior and informed consent (FPIC) (Hanna & Vanclay 2013) – there had been a strong debate about Indigenous rights in Brazil since around the Altamira gathering in February 1989. The Altamira gathering was the first major mobilization of Indigenous peoples in Brazil, and occurred as a form of protest against the building of a large dam (which is now called the Belo Monte Dam) in the Amazon region (Turner 1993; Fearnside 2006). The topics covered in this national debate on Indigenous rights are reflected in Chief Ranulfo's criticism of the consultation process for the Lajeado Dam, and his comparison of its development with a predatory jaguar:

We Xerente are suffering for a long time, and only those of us who are chiefs and leaders in our communities know about our suffering. This [development] looks like a jaguar that wants to devour everything, not only the Indigenous, but also the white [people]. This progress will bring people we don't know close to us. Which chiefs were consulted? In our Reserve there are 30 chiefs and only 4 were consulted. The agencies responsible for monitoring need to be aware of this. We are here now, looking in each other's eyes, trying to find a way to get out of the jaguar's mouth. (Seminário 1998, p. 38 – author translation)

Among the first impacts of the dam to be mentioned in most of our interviews were the decline in fish stocks and episodes of fish-kill. Prior to the dam, fish were the primary source of protein for the Xerente, and could be easily caught in the Tocantins River or obtained through traditional food sharing networks (Schmidt 2011). A similar impact happened to bushfoods. Due to increasing development pressure on the Indigenous territories, game became scarcer. The Xerente ascribe this to the loss of habitat and to the influx of non-Indigenous workers during dam construction. In addition to urban expansion and associated impacts (e.g. noise, roads, etc.),



many workers hunted on Xerente lands. Alongside the increased pressure on available game, the workers used more efficient equipment, such as four-wheel-drive vehicles with powerful spotlights for night hunting.

Another significant change relates to the traditional farming technique called 'roça de toco,' a variation in slash-and-burn or swidden agriculture. It was stated in interviews that, as a result of PROCAMBIX incentives to farm mechanically, this traditional practice has been largely discontinued. Thus, the inter-generational transmission of traditional farming knowledge has been affected. Indigenous peoples' traditional knowledge, modes of subsistence, cosmology, and their natural environment are all intrinsically inter-related (Descola 2005). Since mechanical agriculture is dependent on the on-going availability of cheap fuel and tractor parts, its implementation failed with the cessation of PROCAMBIX funding. The interviewees affirmed that there was not a return to traditional farming techniques, impacting negatively on their cultural reproduction and food security. Traditional food gathering of bush fruits and native honey was also affected, but not only by the dam. Due to the loss of native habitat for agribusiness expansion (especially soybeans and sugarcane) and the large amount of chemicals used on these monoculture crops, there has been a deleterious impact on native bee, bird, and wildlife populations, significantly affecting the bushfoods eaten by the Xerente. As a result, there has been a significant change in their food habits with most food now being bought in neighboring cities, rather than produced or collected locally (Schmidt 2011).

This change in the diet of Indigenous peoples (in Brazil and elsewhere) has led to a rise in obesity, diabetes, hypertension, and other lifestyle diseases (Gracey & King 2009). The Xerente and other Jê groups share the conception that the non-Indigenous industrialized food is 'weak' and 'full of poison,' and that eating it has made the younger generations weaker and more susceptible to disease (Hanna 2009). The change in food has also led to a rise in the amount of garbage in the villages (Schmidt 2011) and a change in traditional food sharing networks and consequently to a loss of community social capital.

When asked about their evaluation of project outcomes, the Xerente are clear: 'It was 10 million at the time, a lot of money! Today we cannot really see where the money has gone.' They stated that the legacy of the program can only be observed by the three items that were still standing in 2014 (when the interviews were conducted): (1) the rusty tractors that are lying about, abandoned due to lack of resources for their maintenance after the program ended; (2) a Cultural Center in the city of Tocantínia, which was built to keep an archive of materials and allow the Xerente to have a facility for their internal and external administrative affairs, and is

now also used for a range of other purposes; and (3) the few head of cattle provided to each family through one of the last projects of PROCAMBIX.

According to the interviewees, the failure of the livelihood projects could be attributed to inadequate technical support. Where there was support from agronomists or other technicians, projects were typically abandoned or failed after they left. Unfortunately, in most situations there was inadequate capacity building to enable the Xerente to continue these projects autonomously, independent of the technical support. Another reason given for the failure of some projects was the inadequacy of the engagement processes about what local households wanted to produce. For example, chicken coops were provided to every family in an attempt to have a fair distribution of benefits, however not every family was willing to raise chickens. Furthermore, chicken and eggs are not part of the Xerente culture or their traditional diet. People said that there were times when there was an excess of eggs, with many people tired of eating them, and no mechanism for their sale.

The lack of representation of all clans on the PROCAMBIX steering committee was another problem voiced in the interviews. Members of some clans considered that not all clans were equally enjoying the benefits of the projects, especially with regard to which individuals (and their clans) were employed by the program. Because of the conflicts between the clans, one MPF Federal Prosecutor we interviewed conjectured that the PROCAMBIX program might have caused more harm than the dam itself. It is very clear that there is recognition that PROCAMBIX had many negative consequences, as one Xerente interviewee stated:

From the time PROCAMBIX emerged, it caused this division in the relationship and respect between the clans. They became divided, all because of the dam. We realize today that thinking about a program that will minimize the impacts is very complex, because it is not just about bringing in [mitigation] projects. It is not just that – it goes much further than that – the survival of 'a people' is at risk, the culture of a people, the speech, the language of the people, their customs, respect, belief, dance. Then it all ends up being affected, as it affected the Xerente Indigenous population.

A Xerente Chief voiced the same opinion and suggested that PROCAMBIX had negatively affected the public image and morale of the Xerente people. According to him, many local non-Indigenous people blamed the Xerente for the various failures of the program. This perception by the non-Indigenous comes from their view that R\$10 million was a lot of money, together with their general prejudice that Indigenous peoples are inherently lazy, and that therefore the failure of the projects had to be the fault of the Xerente, that they just didn't work hard enough. The failure of the program had the effect of exacerbating the negative perception about the Xerente held by the non-Indigenous.

According to the Chief, a discussion about the Xerente which erupted at the national level caused major impacts to their self-identity, leading to apathy and despair, thus hindering the struggle for their rights. He cited a news report circulated widely on the internet, which was written by an anthropologist who had conducted research with them over a long time period. The anthropologist (who was later expelled from the Brazilian Association of Anthropologists) blamed the Xerente for their own fate by arguing that many of the program's beneficiaries had moved out of their villages to neighboring cities, leaving the elderly and children behind in a precarious situation. Other anthropologists who had also worked with the Xerente promptly published a letter of repudiation (Giraldin et al. 2014). They stated that PROCAMBIX did not provide the Xerente with conditions necessary for their economic and cultural reproduction, and confirmed that the significant changes to the downstream water flow regime had impacted negatively on traditional riverside farming techniques and diminished fish and wildlife stocks.

NGOs stated in the interviews that INVESTCO and the federal government were using the program for greenwashing. They told us that PROCAMBIX was being presented to other communities (especially those in the middle of consultations for the construction of new dams) as being very successful and fair in its compensation to the Xerente people. In fact, this was the story we had originally heard about PROCAMBIX and that it was the benchmark of good practice. Our interviews with the Xerente who worked for the program indicated that they shared this same opinion during the execution of the program, however, in retrospect, they perceived many limitations and failures. Reflecting on the resources and efforts deployed, despite the unsatisfactory outcomes, a Xerente Elder who worked for the program stated: 'it was like a hunt, we went with shotgun, machete, dog and all, but the game got away.'

Despite all its failures, some positive impacts were reported in interviews and in the final evaluation report (Cordeiro 2009). In particular, some interviewees mentioned that as a result of PROCAMBIX, the Indigenous organizations learned how to manage the bureaucracy, and their general ability to manage and implement projects increased. PROCAMBIX is still considered good practice in Brazil in the sense that it was the first attempt to implement a systematized program that went beyond a 'wish list' approach and actually implemented a broad, participative, and long-term program. An important success factor for future compensation programs identified in interviews related to the need for engagement and goodwill of key people inside the institutions. Having a committed person inside the licensing authority who has had proper training, has sensitivity for dealing with social issues, and is willing to work hard to ensure that the best interests of the local communities are considered, makes an important difference to how processes are conducted and consequently on the final outcomes.

## 6. Discussion

The final evaluation report prepared for the German Agency for International Development (GIZ) highlighted many of the issues with PROCAMBIX as discussed above:

a series of conditions influenced the performance of the program ... the resizing of the original proposal due to the lower values approved in the agreement; slowness in the processing of administrative procedures; staff turnover in technical departments; the time required for the management of the conflicts of interest inside the Indigenous community; interruption of activities for diverse reasons; complex institutional arrangements with implications to the financial management; an increase in the number of villages during the execution of the program; inherent limitations to the conception of productive projects; and operational challenges. (Cordeiro 2009: Executive Summary – author's translation)

Some of the failures of PROCAMBIX can be associated with a lack of proper consideration of the traditional cultural aspects of the Xerente people. PROCAMBIX was designed by an external group of non-Indigenous consultants, and there was a lack of social scientists, particularly anthropologists. As a consequence, the program failed to consider crucial cultural aspects that negatively influenced the performance of the whole program. For example, one key aspect that was ignored was the existence of clan moieties and the associated tendency for factionalism, which are classic themes in the ethnology of Jê peoples (Fernandes 2012). The lack of adequate consideration of this issue led to many conflicts between the different groups and ultimately to a proliferation of the number of villages. This proliferation is related to the fact that each village had the right to receive certain compensation arrangements. In the development of the program, there should have been an awareness that rival groups would clash over the control of resources. An appropriate strategy would have been to engage with all local stakeholders in a manner that respects their traditional governance structures to find culturally appropriate solutions to avoid conflict between the factions.

Another issue was the lack of support for and alignment with traditional farming techniques. The promotion of mechanized farming ultimately resulted in the abandonment of tractors due to the lack of resources for maintenance after the end of the program. Based on the interviews and document analysis, it appears that the proposed income generation and food sustainability activities seemed to have been considered only from a western perspective, with the Xerente traditional ecological knowledge playing little role in the planning and implementation of the livelihood projects.

Gender issues were also not adequately considered, as was clearly identified in the final evaluation report (Cordeiro 2009, p. 128). This was evident in the composition of the steering committee, which comprised only male Indigenous representatives. Advocating for gender equality in many cross-cultural contexts is a complicated

issue because, for example, political decision-making has traditionally been considered a male forum in Jê peoples ethnology (Lea 2007). However, it could have been possible to make the range of productive activities more inclusive for women if they had have been involved in discussions about what was appropriate for them. According to the evaluation report, the lack of attention given to gender issues was a key factor in the lack of long-term achievements of the program.

Since the beginning of the licensing process for the Lajeado Dam, pressure from organized civil society groups was a positive force for improving the quality and scope of impact assessments and the mitigation and compensation measures. The beneficial results of political pressure have been observed elsewhere (Hanna et al. 2016a, 2016b). For example, at the Ekati mine in Canada, following substantial social pressure, an independent watchdog was established to oversee the implementation of mitigation measures (Ross 2006). In the Lajeado Dam case, the First Seminar was a turning point in the way impacts were being considered. The First Seminar made it clear to the local population, the licensing authorities, and even INVESTCO, that impacts on the Xerente people should not be neglected. The Xerente and their non-Indigenous allies (NGOs, Public Prosecution) forced INVESTCO to conduct an impact assessment study specifically in relation to the impacts on the Indigenous land – which originally was not required ostensibly because the Xerente were located downstream. From the interviews, it becomes clear that the role of protest and NGO activism is absolutely necessary to ensure Indigenous rights are respected and cultural aspects are better considered in EIA (Hanna et al. 2014, 2016a, 2016b).

The total value of the compensation package was the outcome of a conflictual negotiation process rather than a fiscal assessment of the costs of appropriate mitigation and/or compensation entitlement. The mother project suggested a compensation program amounting to R\$14 million. The final amount of R\$10 million was determined by negotiation dynamics, not by technical analysis. Interviewees stated that the extra R\$4 million may have made some difference to the final outcomes, possibly with long-lasting measures. We consider that the value of compensation programs should not be determined by negotiation, but by clear planning of the actions necessary in order to mitigate or avoid the impacts on the local people and to provide reasonable benefits.

A problem with monetizing impacts is that money does not mitigate most impacts, and in fact, a large inflow of money can generate many more impacts (Vanclay 2002; Vanclay et al. 2015), especially when Indigenous peoples are involved (Gordon 2010). Unfortunately, licensing authorities, entrepreneurs, and even impacted communities often have the view that throwing money at the community will fix all issues and impacts (Cernea 2003; Esteves & Vanclay 2009). This leads to situations

where large amounts of money are often provided and spent without consideration given to local culture and practices. Because of the complexity of cross-cultural contexts, proper planning and implementation processes to engage with Indigenous cultures takes more time and human resources than engagements with western communities (O'Faircheallaigh 2007).

Companies usually do not have the internal expertise on social development, making it necessary for them to hire consultants and sometimes use inexperienced internal staff to deal with the 'social issues' (Kemp & Owen 2013). Due to the lack of consideration of social issues, conflict with communities can occur and top-management will have to expend much more time and resources dealing with the so-called non-technical issues (Franks et al. 2014).

The strong alerts and red flags raised in the mid-term evaluation (de Paula 2003) apparently had little impact since most of the problems highlighted were also present in the final evaluation report (Cordeiro 2009). In its contribution to the midterm evaluation, the Office of Public Prosecution stated that the program implementation seemed to be like a 'runaway train,' and recommended that the pace of spending should be slowed down so that the term of expenditure could be doubled from 8 to 16 years (de Paula 2003, 2005). This suggestion was not taken up by the steering committee, possibly because, as some interviewees suggested, INVESTCO wanted to spend the agreed sum as soon as possible and 'get rid' of its responsibility for the 'Indigenous problem,' thus fulfilling its legal obligations and enabling its staff to focus again on 'core business' (Kemp & Owen 2013). Because of all the concerns, the mid-term evaluation recommended that, if corrections to the program were not made, it 'might be better just to divide the money among all [Indigenous] families' (de Paula 2003, p. 24, author translation).

Given the scale of PROCAMBIX and the fact that it was one of the first structured compensation programs for Indigenous peoples in Brazil, it is surprising that most of the institutional memory about it has been lost or is inaccessible. During our visits to the licensing authority (Naturantins), when we asked for access to the documentation relating to the program and the EIA for the Lajeado Dam, we were informed that it was in the 'sarcophagus' – meaning the rarely accessed, 'dead' archives, characterized by dust and disorganization. This demonstrates the lack of institutional capacity and inability for institutional memory and learning in many Brazilian governmental agencies, especially at the regional level. This is partly related to the high staff turnover, as was pointed out in some interviews. In Brazil and many other countries, a newly elected government might change the whole staff of regulatory agencies, leading to their lack of commitment to long-term planning. We note that into the future this archive issue might improve given the digital revolution, with most documents now being stored online.

The position put in our interviews with representatives of the Brazilian authorities was that INVESTCO had fulfilled its legal role in conducting the EIA and compensation program according to the law, even though it was acknowledged that the mitigation strategies had largely failed. To some extent, this is also reflected in the judge's decision on the class action filed by the Xerente against INVESTCO, in which the Xerente requested ongoing funding for the program. The judge argued that INVESTCO had fulfilled its obligation in mitigating the impacts by conducting the agreed program and spending the agreed amount, regardless of the difficulties in implementation (Ação Civil Pública 2013). Thus, a legalistic approach seems to be dominant within government and INVESTCO.

## 7. Conclusion: making a case for considering the cultural dimensions

Based on our observations about the design and implementation of PROCAMBIX, some recommendations can be made that may assist future project developers, government institutions, NGOs, and Indigenous peoples facing project implementation. The first recommendation relates to a common problem in impact assessment, the excessive focus on the environment to the detriment of the social (Baines et al. 2013). This is evident in the program's name, the Xerente *Environmental* Compensation Program. It is also evident in the disciplinary background of the staff members who were engaged to design and implement the mitigation measures. Although some anthropologists and other social scientists were engaged at certain specific moments, the majority of the staff were environmental practitioners. Serious consideration of the social and cultural aspects of any project is strongly recommended. This would be enhanced by the use of ethnographic fieldwork, especially in situations where the communities are culturally differentiated. If cultural aspects are not considered, it is likely that the mitigation plans and compensation arrangements will create negative impacts instead of mitigating them.

Protest action played a key role in the environmental licensing process and the initiation of PROCAMBIX. Without this community mobilization, it is likely that no specific impact assessment addressing the impacts experienced by the Xerente would have been conducted. However, the Xerente are not as empowered in the national and international political spheres to the same extent other Amazonian Indigenous groups are (Conklin 1997), therefore they did not have enough leverage to enforce the continuity of the program. This demonstrates how, despite the rise of robust EIA procedures in Brazil, culturally differentiated peoples are still left worse off when large projects affect their lives (Hanna et al. 2014; Zanotti 2015). This is especially the case because processes do not fully respect the principle of FPIC, and consequently fail to consider the sociocultural aspects of

impacted groups. FPIC is intended to imply an on-going process of meaningful engagement in which communities are continually involved in the decision-making processes that affect their lives, and not just as a once-off consultation for project approval (Hanna & Vanclay 2013).

It was clear in the interviews and literature review that the Xerente cosmology is reflected in their worldview, and in their perceptions about the dam, its impacts and the compensation program. The negative impacts of development and its non-Indigenous agents were compared to jaguars who devour the natural environment and destroy the Indigenous cultures, while the positive impacts (the compensation plan and its resources) were compared to a 'fat tapir' to be feasted upon. However, the inadequacy of cultural understanding in the implementation of PROCAMBIX led to a lack of retention of benefits locally. Very few benefits or infrastructure from the project remain, despite the expenditure of a considerable amount of money (the equivalent of about USD 5 million). Thus, the whole process of project implementation was compared to a hunt that failed to capture the prey.

Conducting ethnographic fieldwork in itself will not necessarily ensure that the cultural aspects will be properly considered in project development. However, it can be a basis for fostering culturally appropriate engagement processes between the different stakeholders. Anthropologists who have conducted extensive fieldwork with the group in question and understand that group's culture are likely to be able to act as an effective translator and mediator (Henriksen 2004). In the case of PROCAMBIX, if local people had have been properly engaged in the design and selection of the livelihood projects, the program would have been more likely to achieve sustainable outcomes.

Despite the regular steering committee meetings with some leaders representing the Xerente communities, there was not an appropriate process of participation at the village or household level. Each family should have been able to decide on the kinds of projects they wished to participate in. Difficulties in decision-making and reporting back to Indigenous communities have been encountered in the functioning of multi-stakeholder steering committees elsewhere (Ross 2006), demonstrating that this is a common problem in cross-cultural EIA-follow-up. Improved cross-cultural governance arrangements that fully respect FPIC and the Indigenous right to self-determination should be put in place to enable equitable Indigenous participation.

The environmental licensing process in Brazil, and arguably almost everywhere, tends to ignore the cumulative impacts of different projects in the same area. While impact assessments are required for each individual project, there is little or no consideration of the impacts of projects on each other. Impacts influence each other, and in most cases are amplified (Vanclay 2002). Cumulative



impacts tend to become more severe with development pressure, however, national legislation around the world typically does not require EIAs to address cumulative impacts, or, where this is required, the studies tend to be shallow (Therivel & Ross 2007; Gunn & Noble 2009; Canter & Ross 2010). This has particularly adverse effects on Indigenous peoples (Ortolano & May 2006). In the Lajeado Dam case, the other projects that also contributed to cumulative environmental and social impacts included roads, other dams in the region, the expansion of agribusiness, and the creation of an inland shipping route (*Hidrovia Tocantins-Araguaia*). Each of these projects was analyzed individually without any consideration of the other on-going projects in the region, or of any other projects being implemented or planned. In the case of large-scale agriculture, there is no requirement for EIA, despite its grave consequences on the local environment and surrounding communities.

The Lajeado Dam was the first major infrastructure project in the state of Tocantins, and had considerable subsequent impacts. For example, the price of surrounding land increased exponentially, many kilometers of roads were built, and the region is now considered to be very important for agribusiness, particularly the production of soybeans. Such long-term impacts also tend to be ignored in the licensing processes of large projects (Bartolomé 2008). All this 'development' that accompanied the dam negatively affected the Xerente people's way of life, as the chiefs highlighted at the First Seminar in 1998. Unfortunately, the Brazilian environmental licensing process is still not able to adequately address these issues. In the environmental licensing processes, more consideration must be given to the cumulative and long-term social and environmental impacts that stem from the developments that accompany projects.

A final recommendation, which is being discussed by impacted peoples and social impact scholars around the world, is that an endowment fund to assist the on-going sustainable development of the affected group should be created (IFC 2015; Melia 2015; Vanclay et al. 2015). The fund would normally be invested in a managed low-risk portfolio, with a sustainable level of withdraws to fund worthwhile projects proposed and implemented by the local people themselves. This would provide the opportunity for communities to implement projects truly relevant to them, and would increase their ownership, contributing to sustainable and locally positive outcomes.

## Acknowledgements

I would like to thank the support of Cássio Inglez de Sousa, Luís Roberto de Paula, Odilon Moraes and Héber Gracio for the conduction of this research.

## Disclosure statement

No potential conflict of interest was reported by the authors.

## Funding

This work was supported by the Faculty of Spatial Sciences, Rijksuniversiteit Groningen.

## ORCID

Philippe Hanna  <http://orcid.org/0000-0003-2399-5787>

Frank Vanclay  <http://orcid.org/0000-0002-9945-6432>

## References

- Ação Civil Pública. 2013. Programa de Compensação Ambiental Xerente – PROCAMBIX Legitimidade da FUNAI para compor a relação processual Coisa julgada material reconhecida Relativização da coisa julgada não acatada [Xerente Environmental Compensation Program - PROCAMBIX. FUNAI legitimacy to form the procedural relationship. Res judicata recognized material. Relativization of res judicata not accepted]. (Court case number: 0001399-5120104014300, p. 548). [cited 2016 Feb 11]. Available from: <http://trf-1.jusbrasil.com.br/jurisprudencia/23126876/apelacao-civel-ac-1399-to-0001399-5120104014300-trf1>
- Agência Estado. 2001, February 15. Índios Xerente seqüestram oito pessoas [Xerente Indians kidnap eight people]. Estado de São Paulo. [cited 2016 Feb 11]. Available from: <http://politica.estadao.com.br/noticias/geral,indios-xerente-sequestram-oito-pessoas,20010215p30822>
- Araújo RM. 2003. Uma retrospectiva da expansão do sistema elétrico na bacia do rio Tocantins, com estudo de caso na região de Lajeado – Palmas – Porto Nacional, (TO), 1996–2003 [A retrospective of the electric system expansion in the Tocantins River basin, with a case study in the region of Lajeado - Palmas - Porto Nacional (TO), 1996–2003] [Master thesis]. Campinas: Unicamp. [cited 2016 Feb 11]. Available from: [http://www.ifch.unicamp.br/profseva/dissertMestr\\_RubensAraujo\\_03.pdf](http://www.ifch.unicamp.br/profseva/dissertMestr_RubensAraujo_03.pdf)
- Baines J, Taylor CN, Vanclay F. 2013. Social impact assessment and ethical social research principles: ethical professional practice in impact assessment Part II. Impact Assess Project Appraisal. 31:254–260.
- Ballard C, Banks G. 2003. Resource wars: the anthropology of mining. *Ann Rev Anthropol*. 32:287–313.
- Bartolomé LJ. 2008. GDPs y desplazamientos poblacionales: Algunas claves para su comprensión como procesos sociales complejos [LDPs and population displacements: some keys to its understanding as complex social processes]. *Ilha*. 10:8–25.
- Canter L, Ross B. 2010. State of practice of cumulative effects assessment and management: the good, the bad and the ugly. *Impact Assess Project Appraisal*. 28:261–268.
- Cernea M. 1997. Hydropower dams and social impacts: a sociological perspective. *Social development papers*. Washington (DC): World Bank.
- Cernea M. 2003. For a new economics of resettlement: a sociological critique of the compensation principle. *Int Soc Sci J*. 55:37–45.
- Chase A. 1990. Anthropology and impact assessment: development pressures and indigenous interests in Australia. *Environ Impact Assess Rev*. 10:11–23.
- Conklin BA. 1997. Body paint, feathers, and vcrrs: aesthetics and authenticity in Amazonian activism. *Am Ethnol*. 24:711–737.
- Cordeiro A. 2009. Avaliação dos projetos desenvolvidos no âmbito do programa de compensação ambiental Xerente Procambix. Produto 04: Relatório Final da Avaliação [Evaluation of the projects developed under the Xerente

- Environmental Compensation Program Procambix. Product 04: Final Evaluation Report]. Final evaluation consultancy report commissioned by the German Agency for International Development.
- Descola P. 2005. Ecology as cosmological analysis. In: Surrallés A, García HP, editors. *The land within: Indigenous territory and the perception of the environment*. Copenhagen: IWGIA; p. 22–35.
- Engetec. 2015. UHE Luís Eduardo Magalhães, Municípios de Lajeado e Miracema/TO [HEP Luís Eduardo Magalhães, Lajeado and Miracema Municipalities/TO]. [cited 2016 Feb 11]. Available from: [http://www.engetec.eng.br/index.php?option=com\\_content&view=article&id=17:uhe-luis-eduardo-magalhaes-municipios-de-lajeado-e-miracemato&catid=5:projetos](http://www.engetec.eng.br/index.php?option=com_content&view=article&id=17:uhe-luis-eduardo-magalhaes-municipios-de-lajeado-e-miracemato&catid=5:projetos)
- Esteves AM, Vanclay F. 2009. Social development needs analysis as a tool for SIA to guide corporate-community investment: applications in the minerals industry. *Environ Impact Assess Rev*. 29:137–145.
- Esteves AM, Franks D, Vanclay F. 2012. Social impact assessment: the state of the art. *Impact Assess Project Appraisal*. 30:35–44.
- Fearnside P. 2006. Dams in the Amazon: Belo Monte and Brazil's hydroelectric development of the Xingu River Basin. *Environ Manage*. 38:16–27.
- Fernandes ER. 2012. "Eles querem é nos pôr na briga deles!": Um estudo de caso sobre faccionalismo e estratégias entre os índios Xavante (MT) ["They want to put us in their fight!": a case study of factionalism and strategies among the Xavante Indians (MT)]. *Campos*. 13:23–39.
- Franks DM, Davis R, Bebbington AJ, Ali SH, Kemp D, Scurrah M. 2014. Conflict translates environmental and social risk into business costs. *Proc Natl Acad Sci*. 111:7576–7581.
- Giraldin O, Gracio H, Demarchi A, Morais O, Pinheiro R, Omim S. 2014. Nota de repúdio às declarações de Edward Luz na reportagem "Índios poderão tudo até que a sociedade dizer chega" [Note of repudiation to the declarations of Edward Luz in the article "Indians can do anything until society says enough"]. [cited 2016 Feb 11]. Available from: <http://racismoambiental.net.br/?p=133205>
- Gordon C. 2010. The objects of the whites: commodities and consumerism among the Xikrin-Kayapó (Mebengokre) of Amazonia. *Tipiti: J Soc Anthropol Lowland South America*. 8:1–20.
- Gracey M, King M. 2009. Indigenous health part 1: determinants and disease patterns. *Lancet*. 374:65–75.
- Gunn JH, Noble BF. 2009. Integrating cumulative effects in regional strategic environmental assessment frameworks: lessons from practice. *J Environ Assess Pol Manage*. 11:267–290.
- Hanna P. 2009. Comida forte e comida fraca: Alimentação e fabricação dos corpos entre os Kaingang da Terra Indígena Xapecó [Strong food and weak food: nourishment and the production of bodies among the Kaingang of Xapecó Indigenous Land] (Santa Catarina, Brasil) [Master thesis]. Florianópolis:UFSC. [cited 2016 Feb 11]. Available from: <https://repositorio.ufsc.br/handle/123456789/92660?show=full>
- Hanna P, Vanclay F. 2013. Human rights, Indigenous peoples and the concept of free, prior and informed consent. *Impact Assess Project Appraisal*. 31:146–157.
- Hanna P, Vanclay F, Langdon EJ, Arts J. 2014. Improving the effectiveness of impact assessment pertaining to Indigenous peoples in the Brazilian environmental licensing procedure. *Environ Impact Assess Rev*. 46:58–67.
- Hanna P, Langdon J, Vanclay F. 2016a. Indigenous rights, performativity and protest. *Land Use Policy*. 50:490–506.
- Hanna P, Vanclay F, Langdon J, Arts J. 2016b. Conceptualizing social protest and the significance of protest action to large projects. *Extr Ind Soc*. 3:217–239.
- Henriksen G. 2004. Consultancy and advocacy as radical anthropology. In: Morris B, Bastin R, editors. *Expert knowledge: first world peoples, consultancy and anthropology*. New York (NY): Berghahn Books; p. 67–79.
- IFC. 2015. Establishing foundations to deliver community investment: a quick guide. Washington (DC): International Finance Corporation. [cited 2016 Feb 11]. Available from: [http://commdev.org/wp-content/uploads/2015/05/P\\_Establishing\\_Foundations\\_Deliver\\_Community\\_Investment.pdf](http://commdev.org/wp-content/uploads/2015/05/P_Establishing_Foundations_Deliver_Community_Investment.pdf)
- João E, Vanclay F, den Broeder L. 2011. Emphasising enhancement in all forms of impact assessment. *Impact Assess Project Appraisal*. 29:170–180.
- Kemp D, Owen JR. 2013. Community relations and mining: core to business but not "core business". *Resour Policy*. 38:523–531.
- Lea V. 2007. Gênero feminino Mebengokre (Kayapó): Desvelando representações desgastadas [Mebengokre (Kayapó) female gender: unveiling worn representations]. *Cadernos Pagu*. 3:85–116.
- Marshall R, Arts J, Morrison-Saunders A. 2005. International principles for best practice EIA follow-up. *Impact Assess Project Appraisal*. 23:175–181.
- Maybury-Lewis D. 1989. Social theory and social practice: binary systems in central Brazil. In: Maybury-Lewis D, Almagor U, editors. *The attraction of opposites*. Ann Arbor (MI): University of Michigan; p. 97–116.
- Melia E. 2015. The political economy of extractive resources. Paper presented at GIZ Esschborn Dialogue Conference 2015; Esschborn.
- Menestrino E, Parente TG. 2011. O estudo das territorialidades dos povos tradicionais impactados pelos Empreendimentos Hidrelétricos no Tocantins [The study of territorialities of traditional peoples affected by hydroelectric projects in Tocantins]. *Braz Geog J Geosci Humanities Res Medium*. 2:1–19.
- Mindlin B. 2002. O fogo e as chamas dos mitos [The fire and the flames of the myths]. *Estudos Avançados*. 16: 149–169.
- Morgan RK. 2012. Environmental impact assessment: the state of the art. *Impact Assess Project Appraisal*. 30:5–14.
- Nimuendajú C. 1942. *The Šerente*. Los Angeles (CA): The Southwest Museum.
- O'Faircheallaigh C. 2007. Environmental agreements, EIA follow-up and aboriginal participation in environmental management: the Canadian experience. *Environ Impact Assess Rev*. 27:319–342.
- O'Faircheallaigh C. 2011. Social impact assessment and Indigenous social development. In: Vanclay F, Esteves AM, editors. *New directions in social impact assessment: conceptual and methodological advances*. Cheltenham: Edward Elgar; p. 138–153.
- Oliveira Reis F. 2001. Aspectos do contato e formas sócio-culturais da sociedade Akwen-Xerente (Jê) [Aspects of contact and socio-cultural forms of the Akwen-Xerente (Jê) society] [Master thesis]. Brasília: UNB. [cited 2016 Feb 11]. Available from: <http://www.antropologia.com.br/divu/colab/d23-freis.pdf>
- OPAN-GERA. 2000. Programa de gestão territorial Xerente: Diagnóstico etnoambiental das terras indígenas Xerente e Funil [Xerente territorial management program: ethnoenvironmental diagnostic of the Xerente and Funil indigenous lands]. Cuiabá: Operação Amazônia Nativa and Núcleo de estudos e pesquisas do Pantanal, Amazônia e Cerrado da Universidade Federal do Mato Grosso.
- Ortolano L, May CL. 2006. Appraising effects of mitigation measures: the Grand Coulee Dam's impacts on fisheries.

- In: Morrison-Saunders A, Arts J, editors. *Assessing impact: handbook of EIA and SEA follow-up*. London: Earthscan; p. 97–117.
- Parente TG. 2015. (In)visibilidade de atores no processo de reassentamentos da Usina Hidrelétrica Luís Eduardo Magalhães, no Tocantins [(In) visibility of actors in the resettlement process of Luís Eduardo Magalhães hydroelectric plant, in Tocantins]. *Territórios e Fronteiras*. 8:149–164.
- de Paula LR. 2000. A dinâmica faccional Xerente: Esfera local e processos sociopolíticos nacionais e internacionais [The Xerente factional dynamics: local sphere and national and international sociopolitical processes] [Master thesis]. São Paulo: USP. [cited 2016 Feb 11]. Available from: <http://www.teses.usp.br/teses/disponiveis/8/8134/tde-23012012-113854/en.php>
- de Paula LR. 2003. Diagnóstico do Programa de Compensação Ambiental Xerente (Procambix) [Xerente environmental compensation program (Procambix) diagnostic]. Midterm evaluation consultancy report commissioned by Fundação Nacional do Índio (FUNAI).
- de Paula LR. 2005. Descaminhos do Programa de Compensação Ambiental [Mis(governance) of the Environmental Compensation Program]. In: Ricardo CA, Ricardo F, editors. *Povos Indígenas no Brasil: 2001–2005*. São Paulo: Instituto Socioambiental (ISA); p. 712–714.
- Roper R. 1983. Ethnography. In: Finsterbusch K, Llewellyn LG, Wolf CP, editors. *Social impact assessment methods*. Beverly Hills (CA): Sage; p. 95–107.
- Ross B. 2006. The independent environmental watchdog: a Canadian experiment in EIA follow-up. In: Morrison-Saunders A, Arts J, editors. *Assessing impact: handbook of EIA and SEA follow-up*. London: Earthscan; p. 178–192.
- Schmidt R. 2011. Nossa cultura é pequi, frutinha do mato: um estudo sobre as práticas alimentares do povo Akwê [Our culture is pequi, the bush berry: a study of the eating habits of the Akwê people] [Master thesis]. Goiânia: UFG. [cited 2016 Feb 11]. Available from: <https://repositorio.bc.ufg.br/tede/handle/tde/1006>
- Seminário Hidrelétrica do Lajeado. 1998. Summary of seminar held at the Order of Attorneys building in Palmas, Brazil. 31 October 1998.
- Slootweg R, Vanclay F, van Schooten M. 2001. Function evaluation as a framework for the integration of social and environmental impact assessment. *Impact Assess Project Appraisal*. 19:19–28.
- Stoffle RW, Traugott MW, Stone JV, McIntyre PD, Jensen FV, Davidson CC. 1991. Risk perception mapping: using ethnography to define the locally affected population for a low-level radioactive waste storage facility in Michigan. *Am Anthropol*. 93:611–635.
- THEMAG. 1996. Estudo de Impacto Ambiental. Volume II Diagnóstico Ambiental. Tomo C, Sócio-Economia [Environmental impact study. Volume II, environmental diagnostics. Tome C, socio-economy]. Palmas: Themag Engenharia. [cited 2016 Feb 11]. Available from: [http://www.edp.com.br/geracao-renovaveis/geracao/tocantins/investco/empresa/documentos-oficiais/eia-rima/Documents/4vol\\_II\\_diag\\_amb\\_tomo\\_a\\_meio\\_fisico.pdf](http://www.edp.com.br/geracao-renovaveis/geracao/tocantins/investco/empresa/documentos-oficiais/eia-rima/Documents/4vol_II_diag_amb_tomo_a_meio_fisico.pdf)
- Thanner MH, Segal MW. 2008. When the military leaves and places change: effects of the closing of an army post on the local community. *Armed Forces Soc*. 34:662–681.
- Therivel R, Ross B. 2007. Cumulative effects assessment: does scale matter? *Environ Impact Assess Rev*. 27:365–385.
- Turner T. 1993. The role of Indigenous peoples in the environmental crisis: the example of the Kayapo of the Brazilian Amazon. *Perspect Biol Med*. 36:526–545.
- Vanclay F. 2002. Conceptualising social impacts. *Environ Impact Assess Rev*. 22:183–211.
- Vanclay F. 2012. The potential application of social impact assessment in integrated coastal zone management. *Ocean Coastal Manage*. 68:149–156.
- Vanclay F, Baines J, Taylor CN. 2013. Principles for ethical research involving humans: ethical professional practice in impact assessment Part I. *Impact Assess Project Appraisal*. 31:243–253.
- Vanclay F, Esteves AM., Aucamp I, Franks D. 2015. Social impact assessment: guidance for assessing and managing the social impacts of projects. Fargo (ND): International Association for Impact Assessment. [cited 2016 Feb 11]. Available from: [http://www.iaia.org/uploads/pdf/SIA\\_Guidance\\_Document\\_IAIA.pdf](http://www.iaia.org/uploads/pdf/SIA_Guidance_Document_IAIA.pdf)
- Westman C. 2013. Social impact assessment and the anthropology of the future in Canada's Tar Sands. *Hum Organiz*. 72:111–120.
- Zanotti L. 2015. Water and life: hydroelectric development and indigenous pathways to justice in the Brazilian Amazon. *Politics Groups Identities*. 2:1–7.
- Zitzke V. 2007. A rede sociotécnica da Usina Hidrelétrica do Lajeado (TO) e os reassentamentos rurais das famílias atingidas [The socio-technical network of the Lajeado hydroelectric plant (TO) and the rural resettlements of affected families] [PhD thesis]. Florianópolis: UFSC. [cited 2016 Feb 11]. Available from: <http://anppas.org.br/novosite/arquivos/TESE%20VALDIR%20ZITZKE%202007.pdf>